

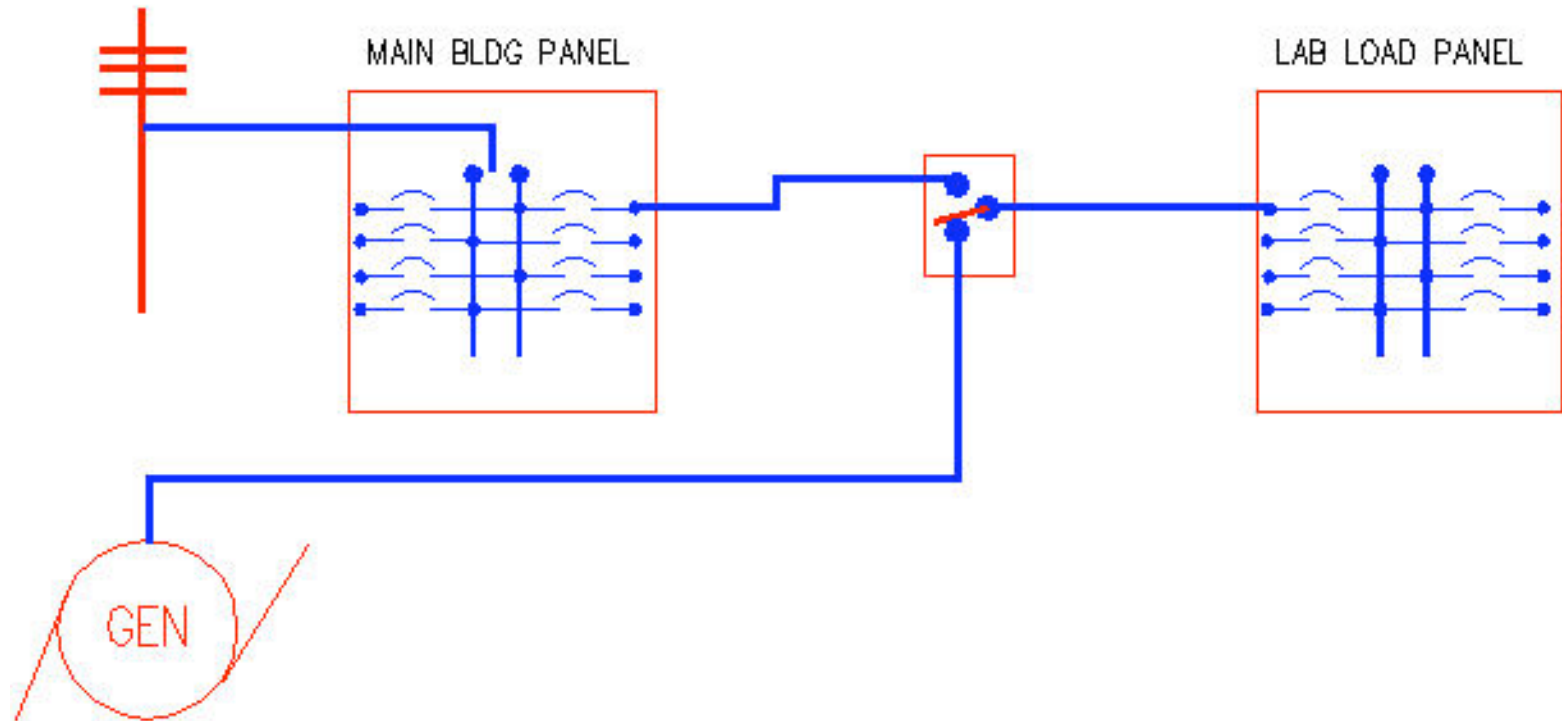


# **Sizing the Generator**

## **Systems Overview**

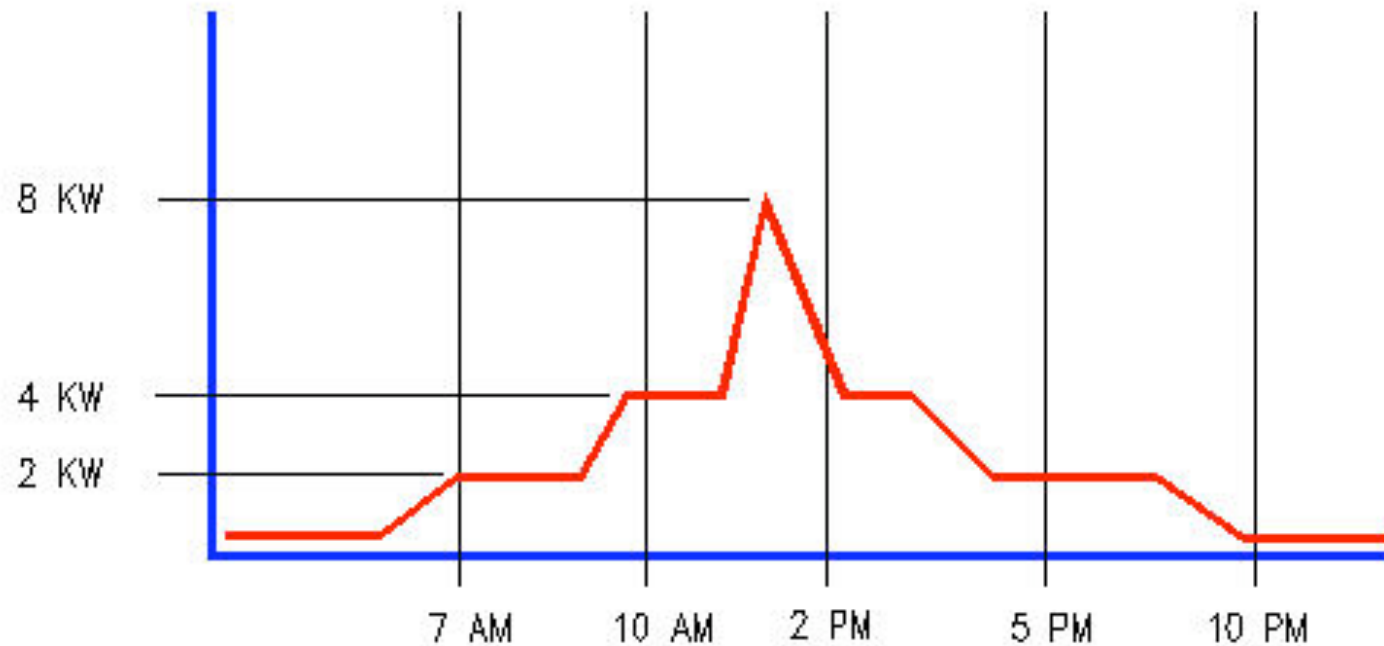


# Typical Back-up Generator Configuration



Generator is sized to power the emergency loads.

# Likely Health Center Load Profile



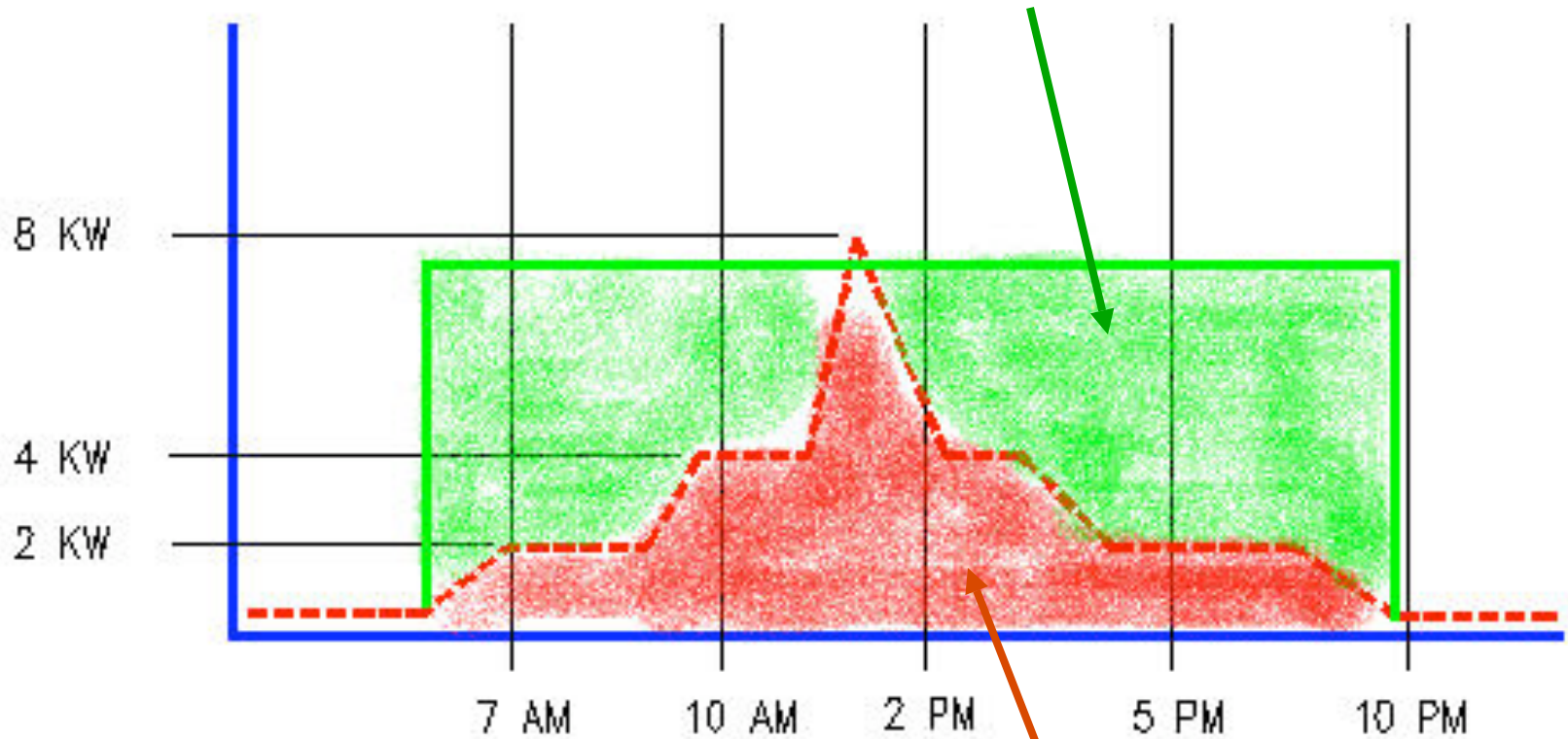
**What size Generator do we need?**

# Sizing the Generator

- In general, a generator must be sized to handle the largest EXPECTED load, with a margin of safety. (recommended 25%)
- In the above case, you would want a generator capable of producing  $8 \text{ KW} \times 1.25 = 10 \text{ KW}$ .
- This means for that for the majority of the time, the generator will be less than  $1/3$  loaded. This is not unusual.

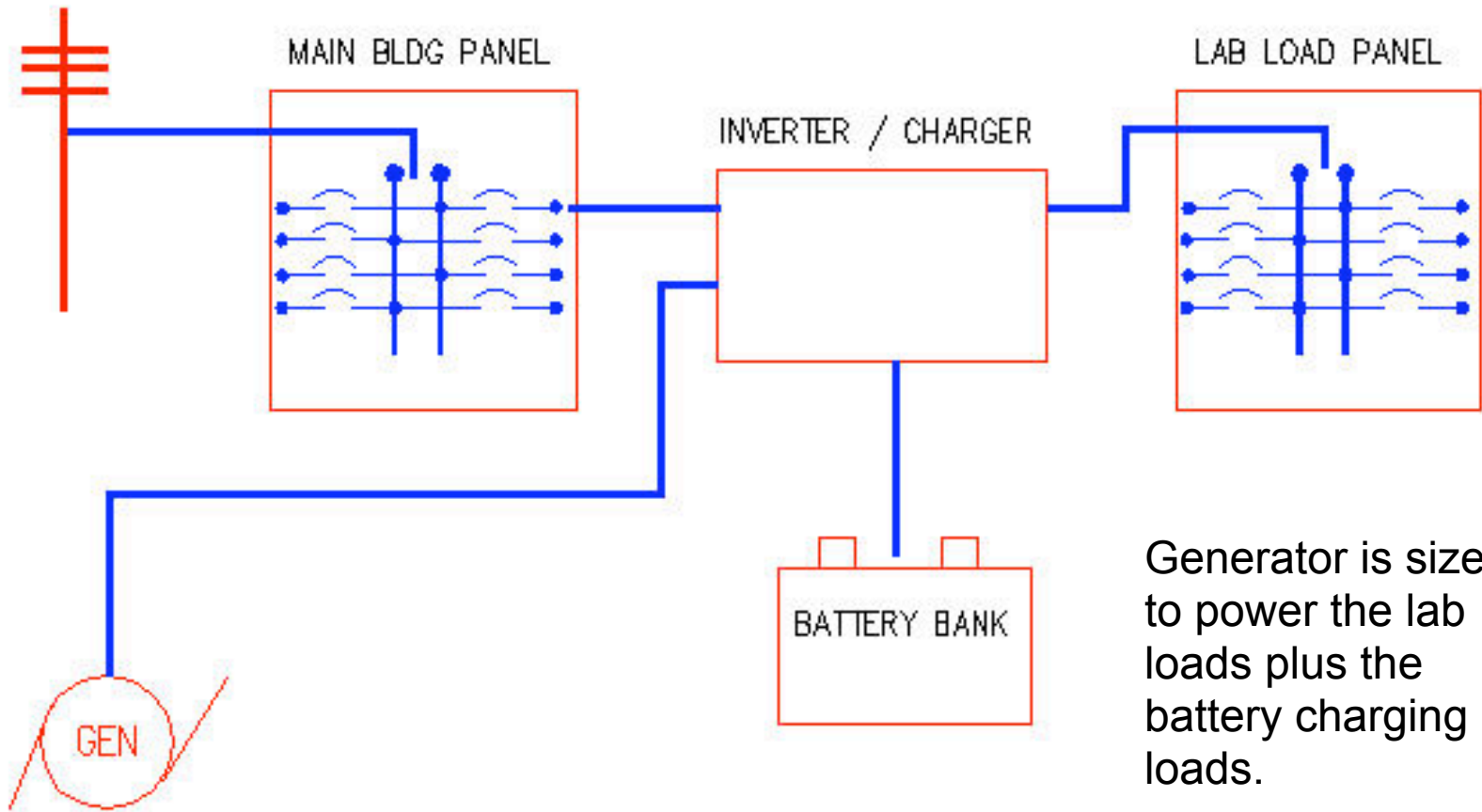
# Generator Alone Sizing Result

Excess Energy Made Available (costs in added fuel)



Energy Needed

# Power for Inverter / Batteries



Generator is sized to power the lab loads plus the battery charging loads.

# Charging the Batteries

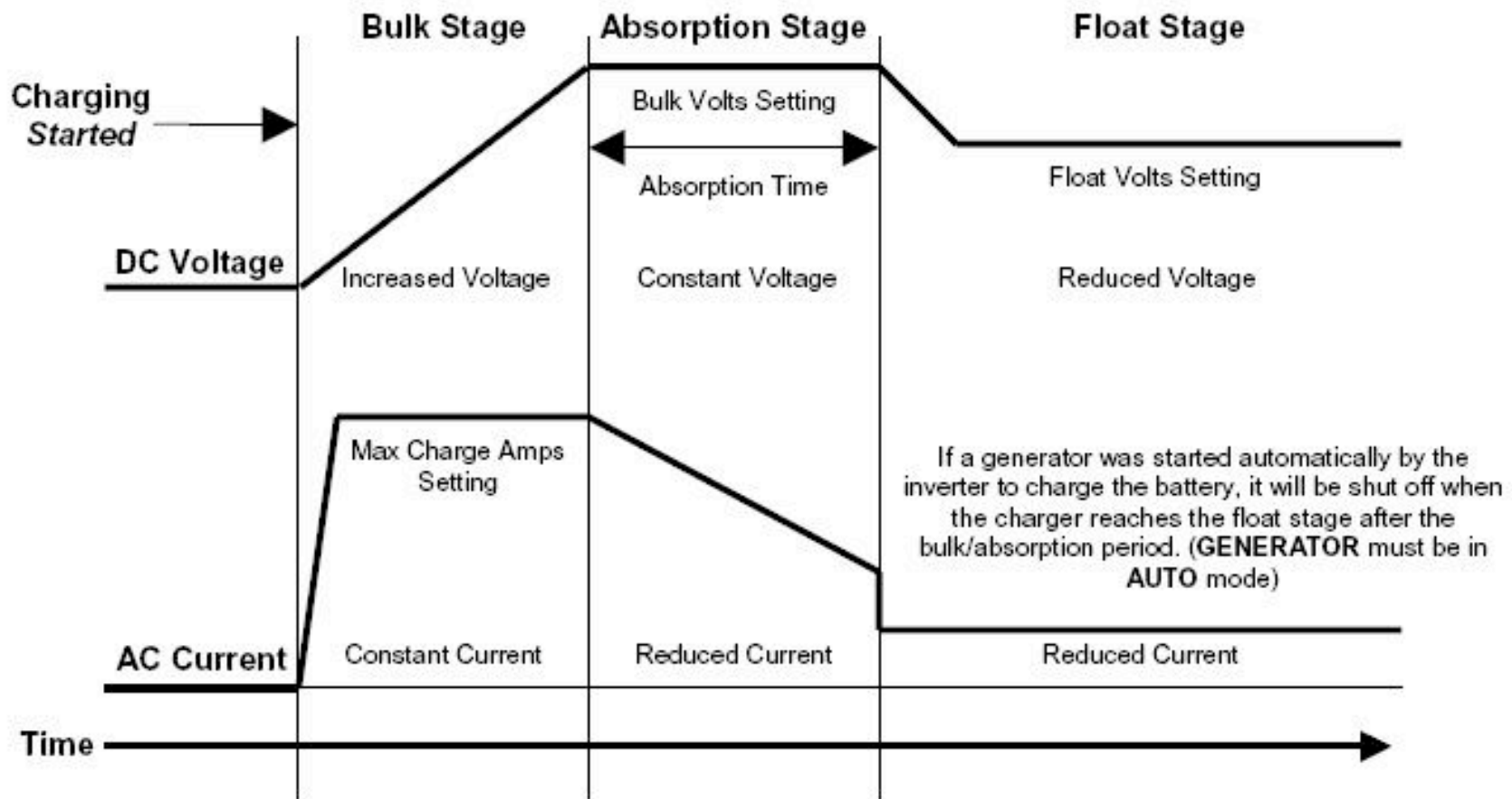


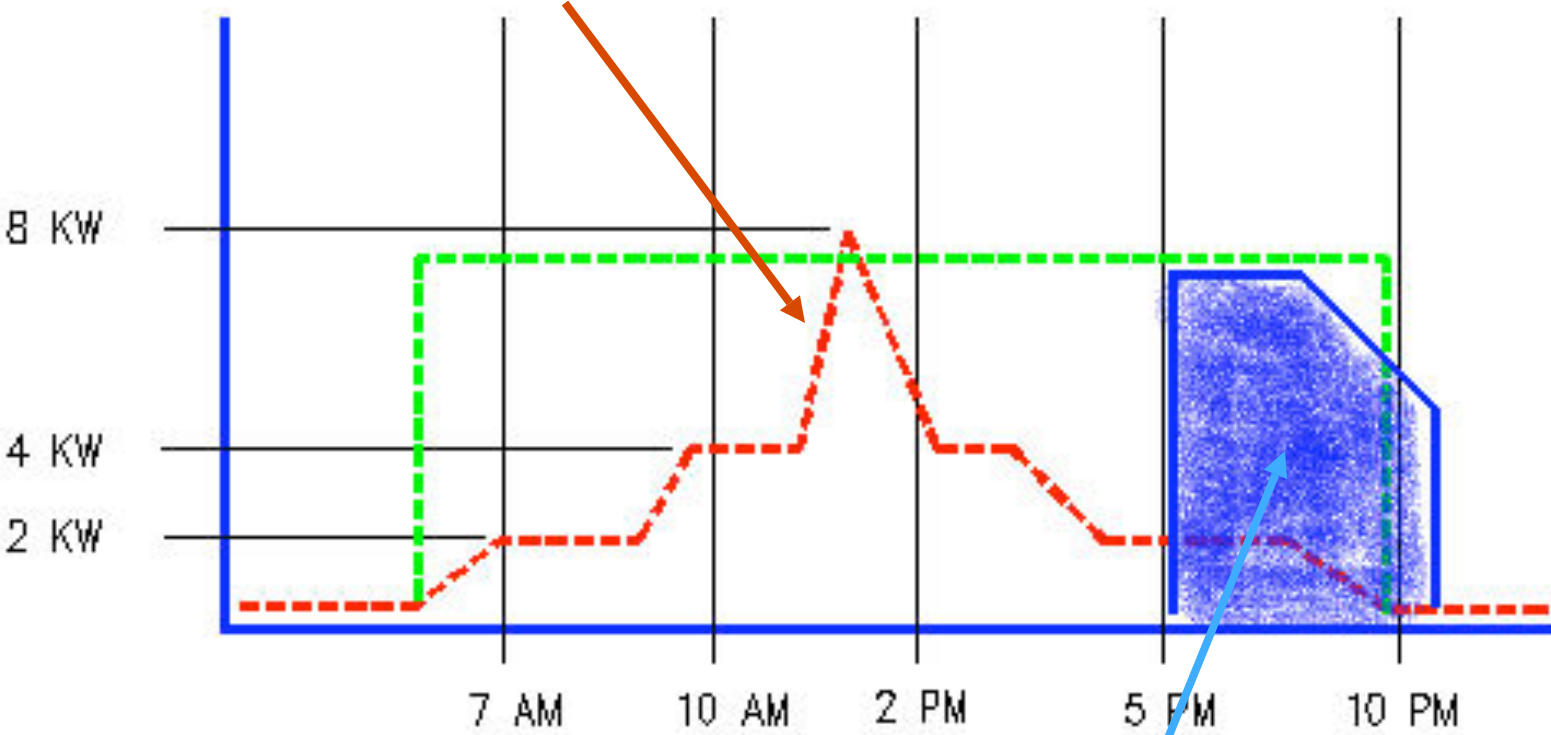
Figure 21, Three-Stage Battery Charging

From SW Owner's Manual



# Generator Run Time with Batteries

Actual Load remains the same



Revised Operating Time of Generator





## Fuel Curve Calculator



Enter the generator's fuel consumption data and HOMER will calculate the two fuel curve input values. You must enter at least two points on the fuel curve. When you click OK, HOMER will copy the values to the Generator Inputs window.

Hold the pointer over an element name or click Help for more information.

Generator size (kW)

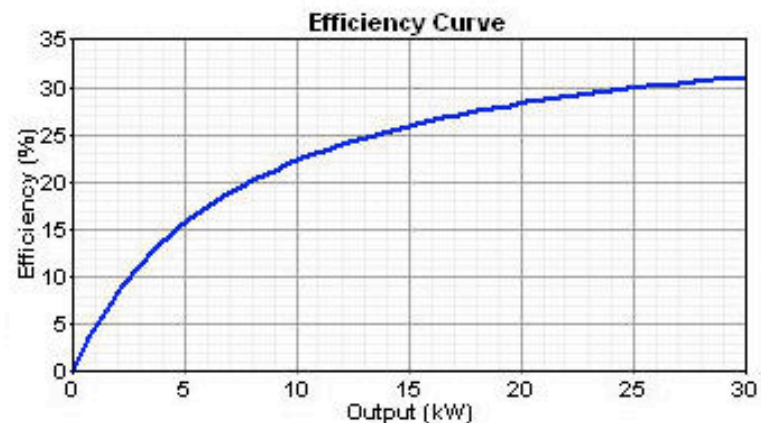
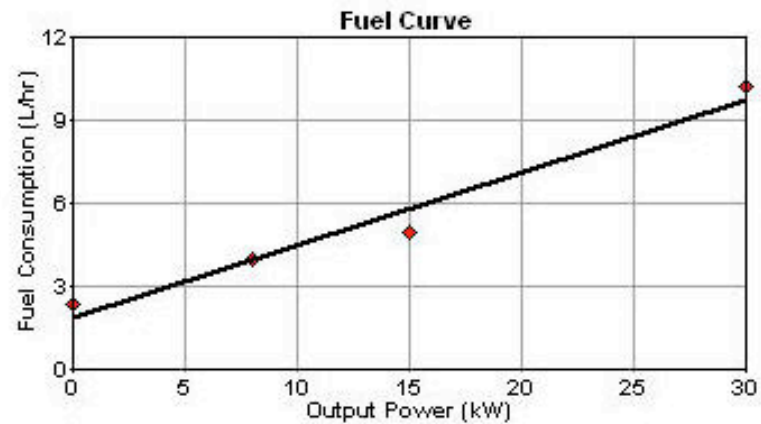
Fuel consumption data

	Output Power (kW)	Fuel Consumption (L/hr)
1	8.000	4.000
2	0.000	2.400
3	30.000	10.250
4	15.000	5.000
5		
6		
7		
8		
9		
10		

Calculated fuel curve parameters

Intercept: 0.0646 L/hr/kW

Slope: 0.2622 L/hr/kW



Help

Cancel

OK

# Generator Fuel Consumption

- This fully loaded 30 KW generator consumes approx. 10 l/hr of fuel.
- When **25%** loaded, (which is normal loading for a generator-only installation), the generator consumes **40%** of the full load fuel.

# Generator Fuel Consumption

- If we can keep a generator loaded closer to its full load rating:
  - The fuel consumption / kwhr will be much better
  - Efficiency will be better (see curve.)
  - Maintenance will be better. (talk to Mfr.)

# The rising cost of Fuel

## A) HAITI – BLOOD BANK – OFF GRID

Scheme	PV Cost Multiplier = 1.0			PV Cost Multiplier = 1.7		
	Initial Capital	$\frac{D=\$1.5/L}{\$/kWh}$ COE	$\frac{D=\$2.5/L}{\$/kWh}$ COE	Initial Capital	$\frac{D=\$1.5/L}{\$/kWh}$ COE	$\frac{D=\$2.5/L}{\$/kWh}$ COE
<b>Limited to 10,000 Whrs/day</b>						
Solar Only	48,000	1.00	1.00	72,000	1.37	1.37
Solar / Diesel Hybrid	51,000	1.00	1.00	76,000	1.40	1.40
Generator / Battery	19,000	1.45	1.92	19,000	1.45	1.92
Generator Only	13,000	3.11	4.23	13,000	3.11	4.23

*From Powering Health – Haiti Assessment*

Inverter / Battery systems, coupled with the generator can save 50% of the operating costs over the long term.

